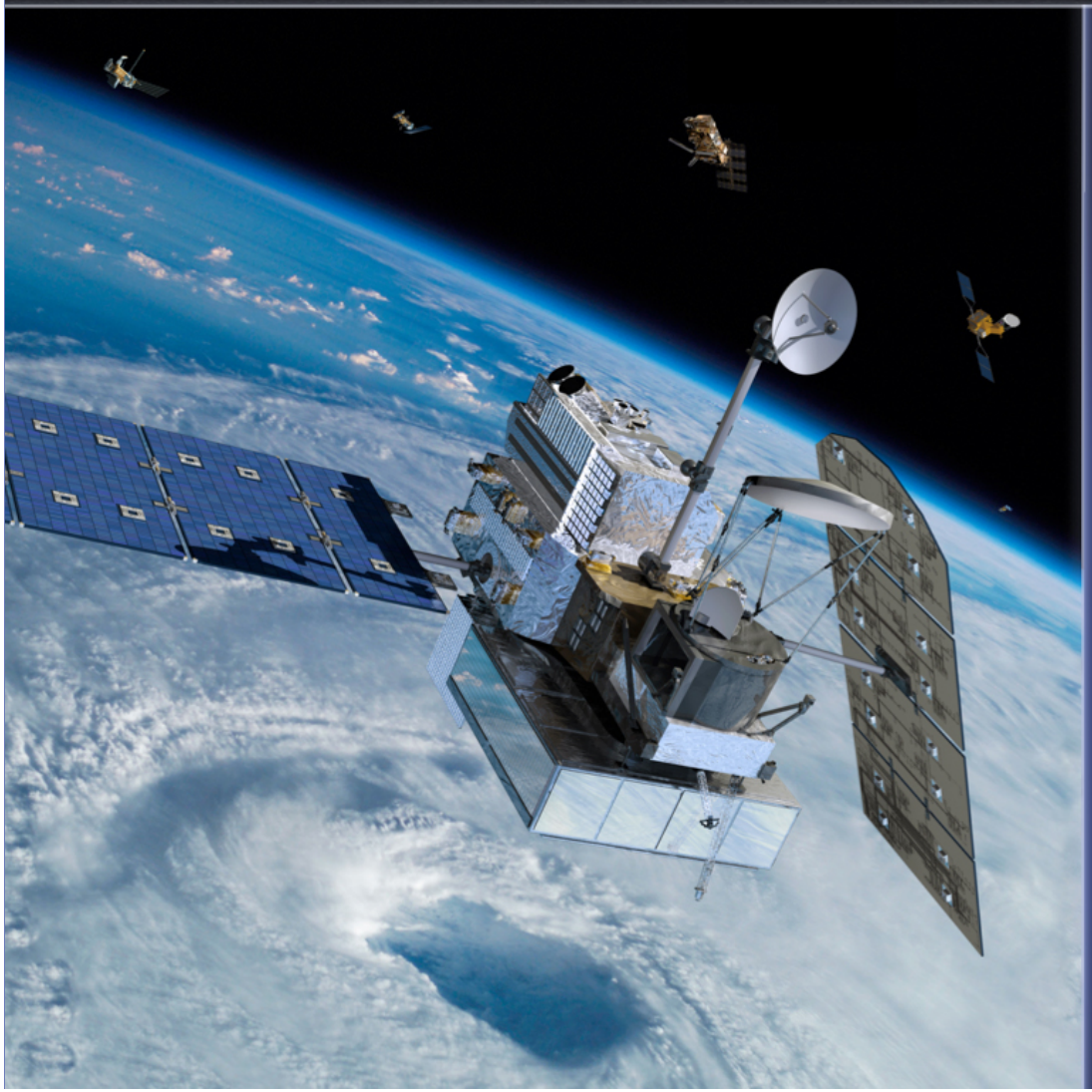
The Global Precipitation Measurement (GPM) Mission Applications and Education/Outreach Activities



Dalia Kirschbaum

GPM Deputy Project Scientist for Applications

www.nasa.gov/gpm

Twitter: NASA_Rain

Facebook: NASA.Rain

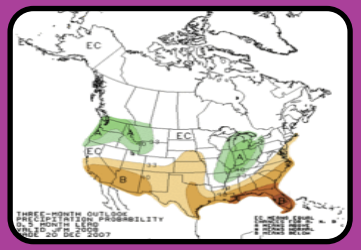
Societal Benefit Areas

Extreme Events and Disasters

- Landslides
- Floods
- Tropical cyclones
- Re-insurance

Water Resources and Agriculture

- Famine Early Warning System
- Drought
- Water Resource management
- Agriculture

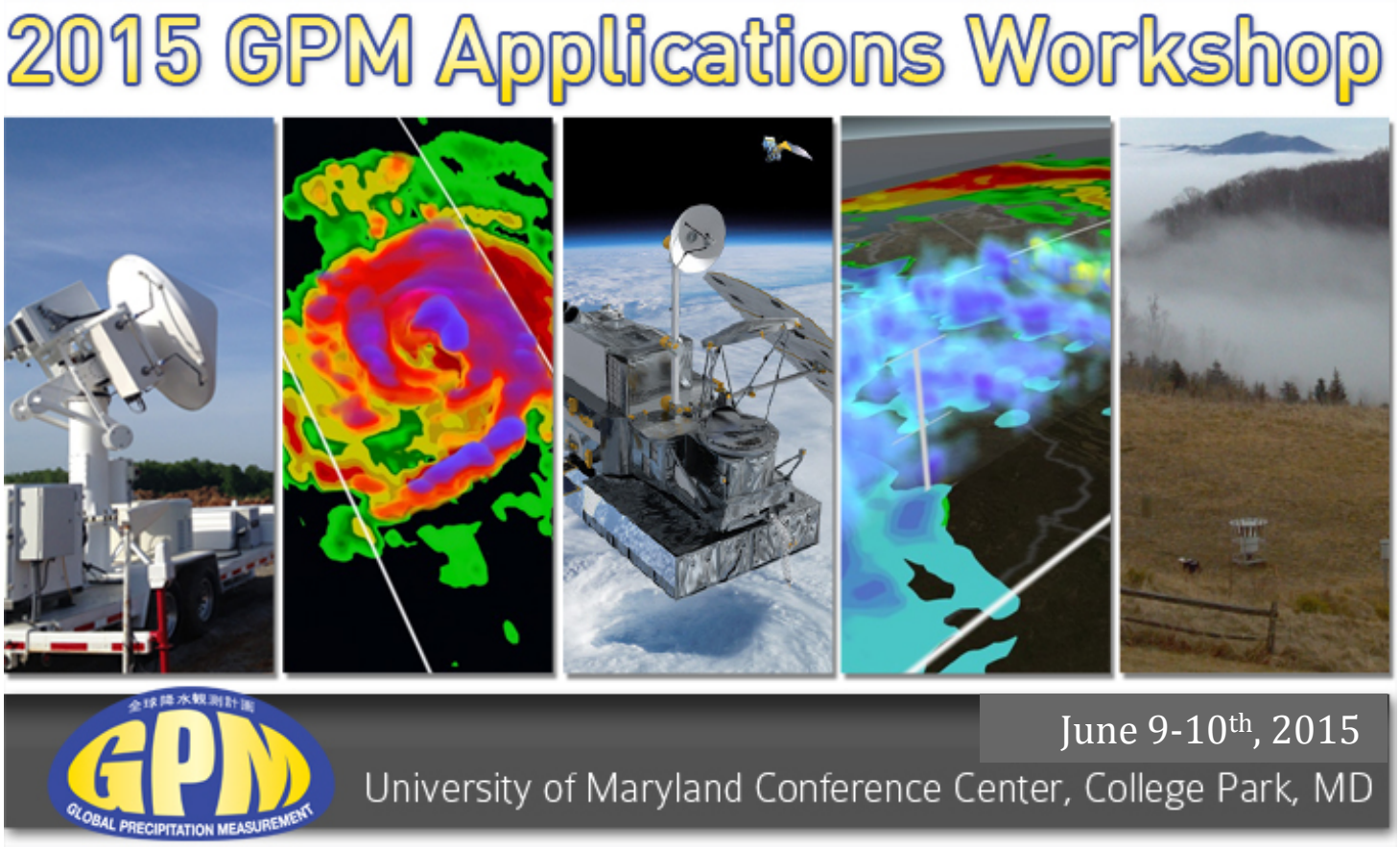


Weather, Climate & Land Surface Modeling

- Numerical Weather Prediction Modeling
- Land System
- Global Climate Modeling

Public Health and Ecology

- Disease tracking
- Animal migration
- Food Security



- 110 Participants, 25 additional on WebEx
- June 11th: Hands on training (4 hours, twice during the day) which introduced data and access while also providing us with insight into the user experience

Workshop Summary

- Representation from:
  - Government (NGA, NRL, US Army, USGS, USDA, OFDA/USAID, NASA)
  - Industry (SwissRe, The Weather Company, Capital Weather Gang)
  - International (PDC, MercyCorps, Red Cross)
  - Academia (several countries represented)
  - Students

- Session on:
  - Scientific achievements
  - Weather Forecasting & Communication
  - Agricultural Modeling/Food Security/Water Resources
  - Ecology and Public Health and Disasters

Workshop Summary

Main Themes coming from the workshop:

1. There is a **clear need** for a long, consistent precipitation record
   - Many users will not transition from TRMM to GPM until that record, or some "bridging" data set
2. Spatial and Temporal Resolution varies by field
   - Having an "early", "late" and "final" product is appreciated and will be utilized by different users
3. Data files, formats and access are not crystal clear
   - Users have difficulty deciding which product to use, how to understand the error, where to access the data, etc.
4. Continuity of precipitation measurements
   - Expectation of continuous and "homogeneous" precipitation records

Tropical Cyclone Forecasting

Privacy Policy Disclaimer **NRL Tropical Cyclone Page** Development Team

NOTE: TRMM sensors were permanently turned off on April 8

2015 Season Storms

All | Active | Year

Atlantic

East Pacific

- 98E.INVEST KML
- 97E.INVEST KML
- 04E.ELA KML

Central Pacific

- 02C.TWO
- 01C.ONE

West Pacific

- 11W.NANGKA KML
- 10W.LINFA KML
- 09W.CHAN-HOM KML

Indian Ocean

Southern Hem.
Season: 16

Latest | Pass_Mosaic | Text | Track | ATCF | Track+Image | WindVectors

Environment | TPW | TPW+NAVGEM_TPW | TPW+NAVGEM_850_Winds | Wind_Shear | COAMPS_TC

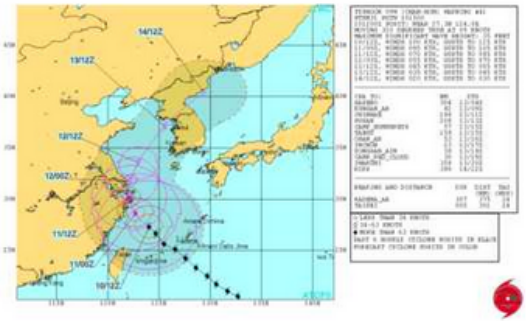
Sensor	% Cov	VIS	IR	IR-BD	Multi Sens.	85GHz H	85GHz weak	85GHz PCT	Color	Rain	Wind	37GHz Color	37GHz V	37GHz H	SSM/I Vapor
SSMI	82														
SSMIS	96														
GMI	59														
AMSR2	35														
WINDSAT	61														
AMSUB	98														

	VIS	IR	Vapor
GAC:			
GEO:			
MODIS:			
VIIRS:			
OLS:			

09W.CHAN-HOM, TRACK_VIS, 10 JUL 2015 1632Z 17:37:04 UTC (Z)

Forecast and Graphic by: Naval Maritime Forecast Center/Joint Typhoon Warning Center

Latest ATCF Track: smwp092015.15071006.jpg

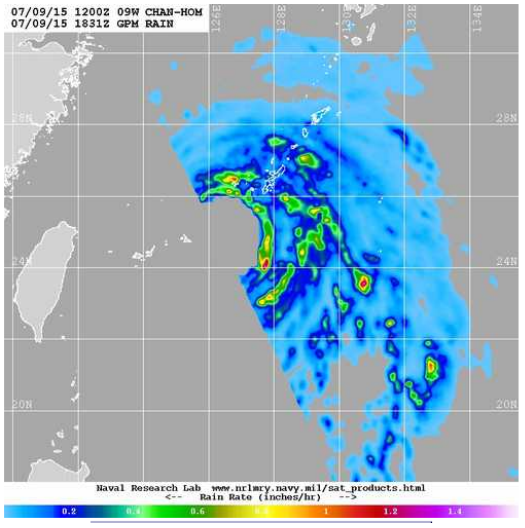


09W.CHAN-HOM, RAIN, 09 JUL 2015 1831Z 17:38:41 UTC (Z)

Tutorials: Overview COMET

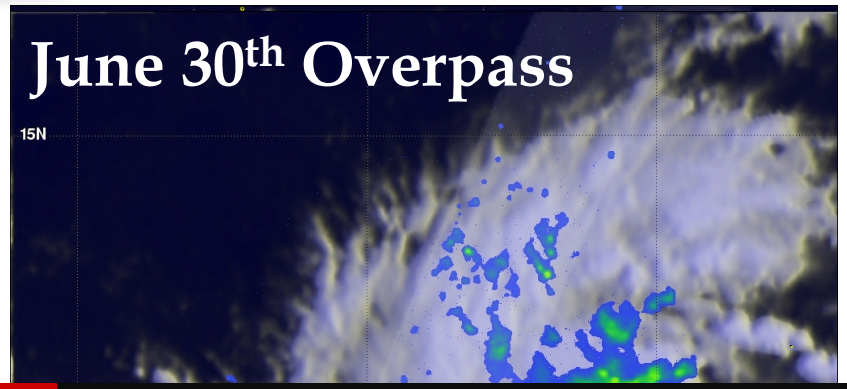
Previous | /SATPRODUCTS/TC/tc15/WPAC/09W.CHAN-HOM/gmi/rain/2degreeticks 20150709.1831.gpm.x.rain.09WCHAN-HOM.100kts-948mb-242N-1276E.59pc.jpg |

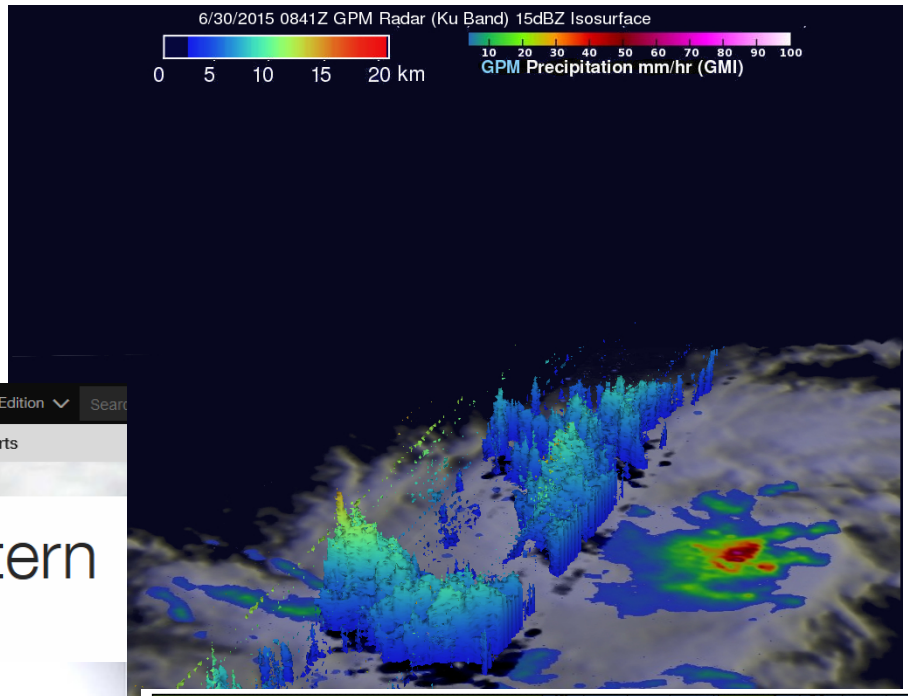
Reduced size (26 K), click image to get full-sized image (305 K).

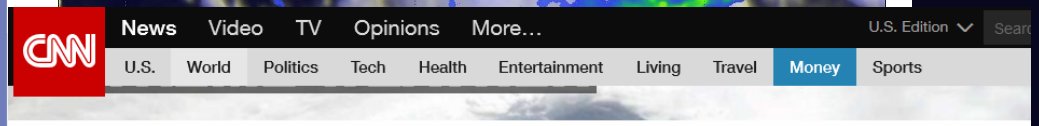


http://www.nrlmry.navy.mil/

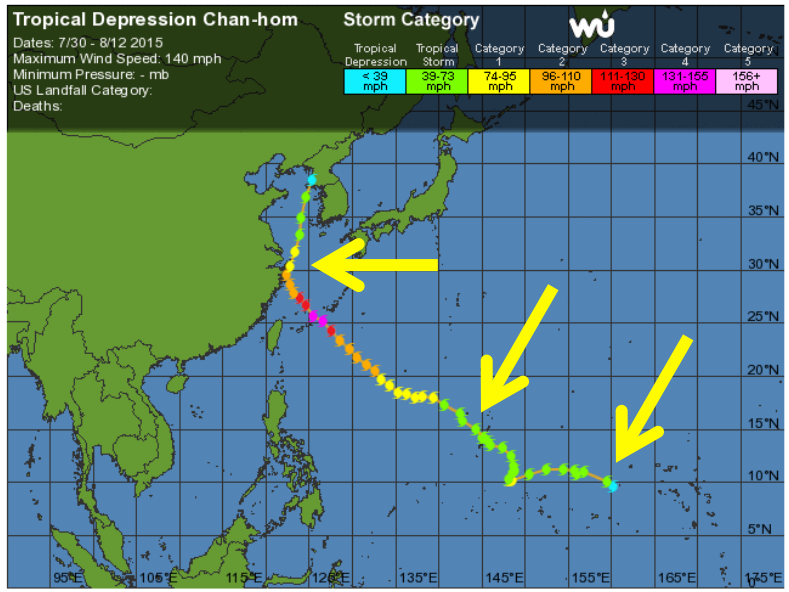
Tropical storm to Typhoon Chan-Hom







Typhoon Chan-hom slams eastern China's Zhoushan city

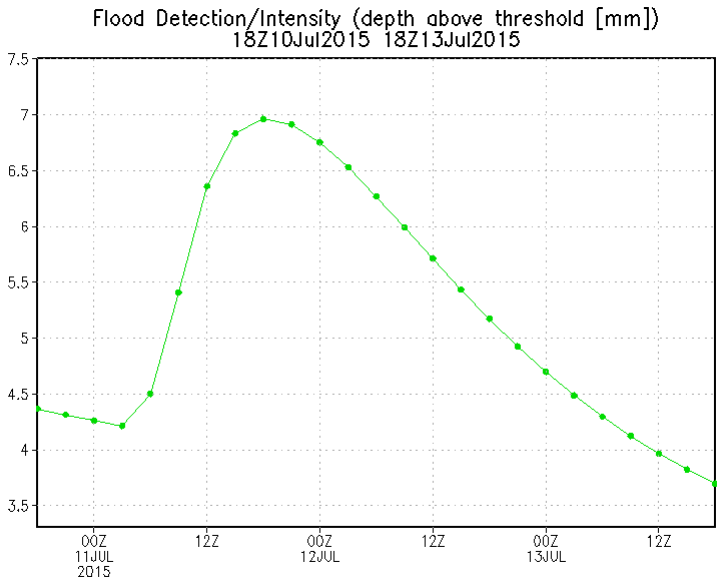


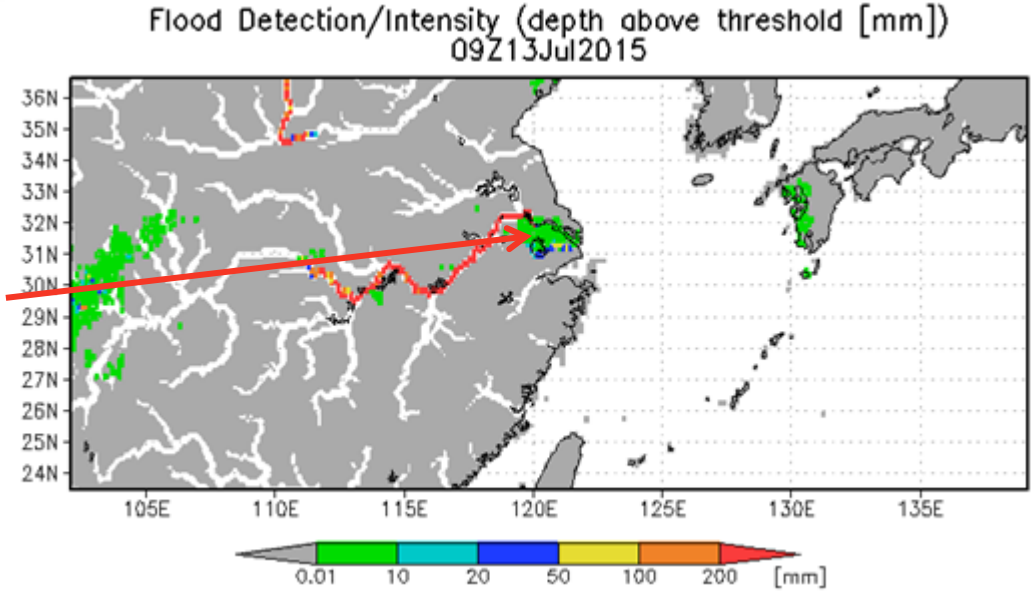
GLOBAL PRECIPITATION MEASUREMENT

Typhoon Impacts

Source: CNN

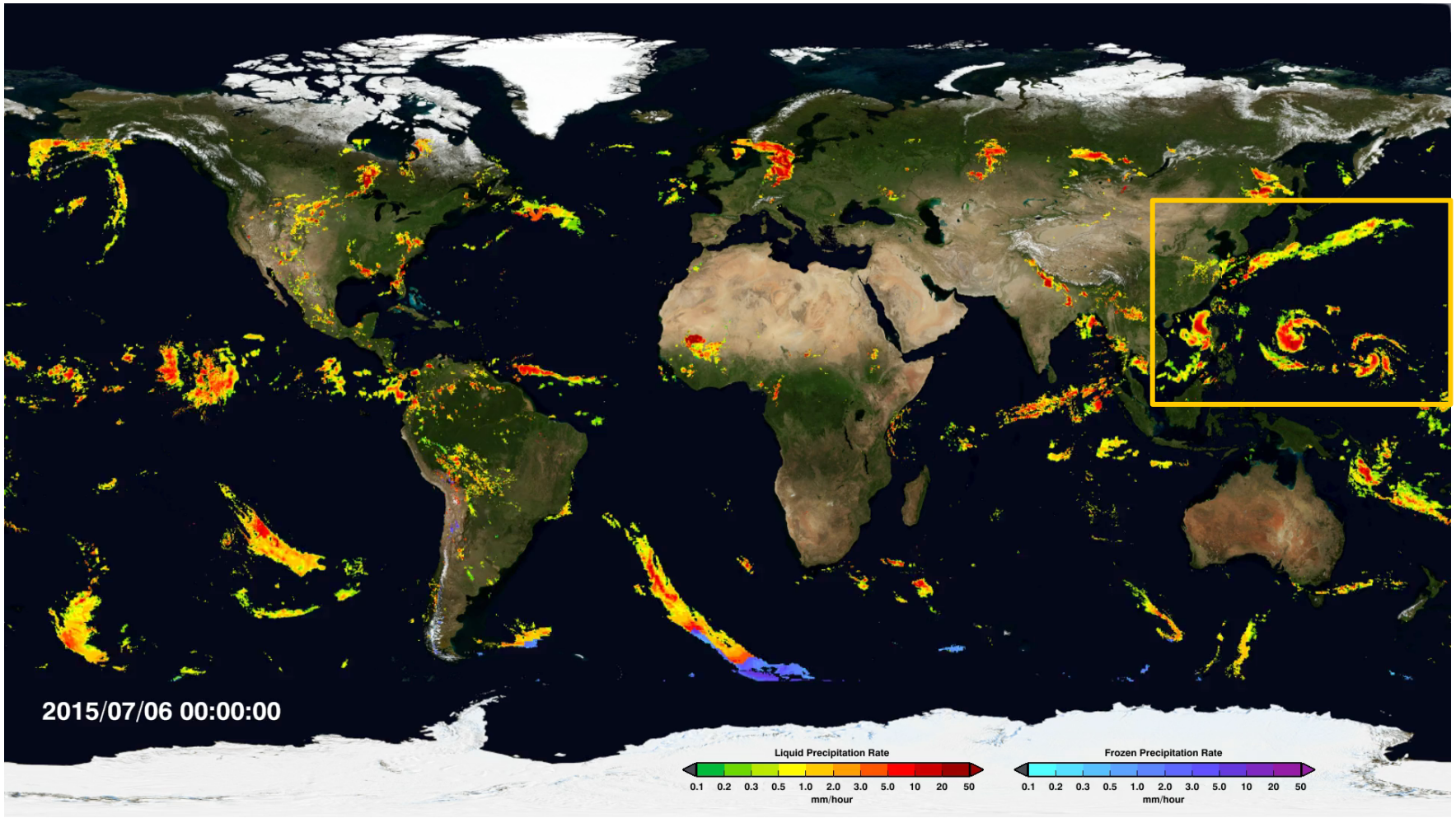
Typhoon floods agricultural fields in China 01:54



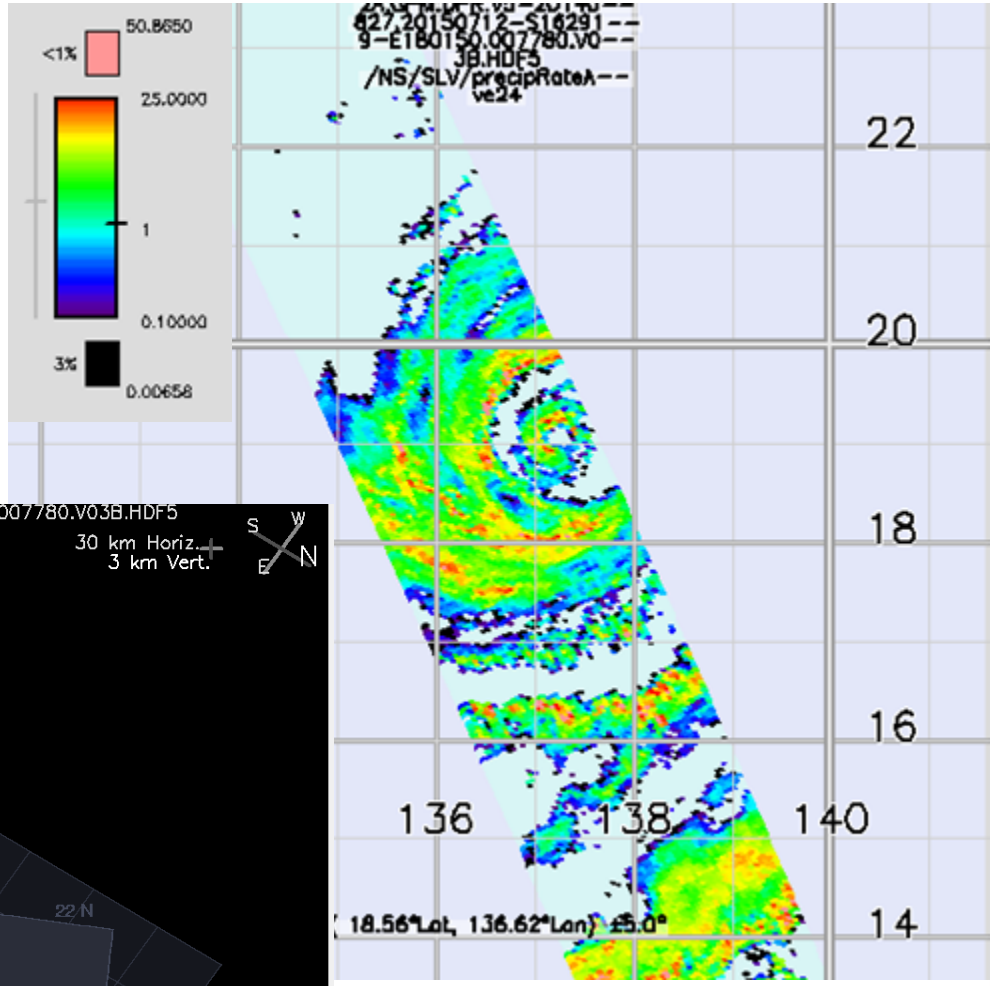


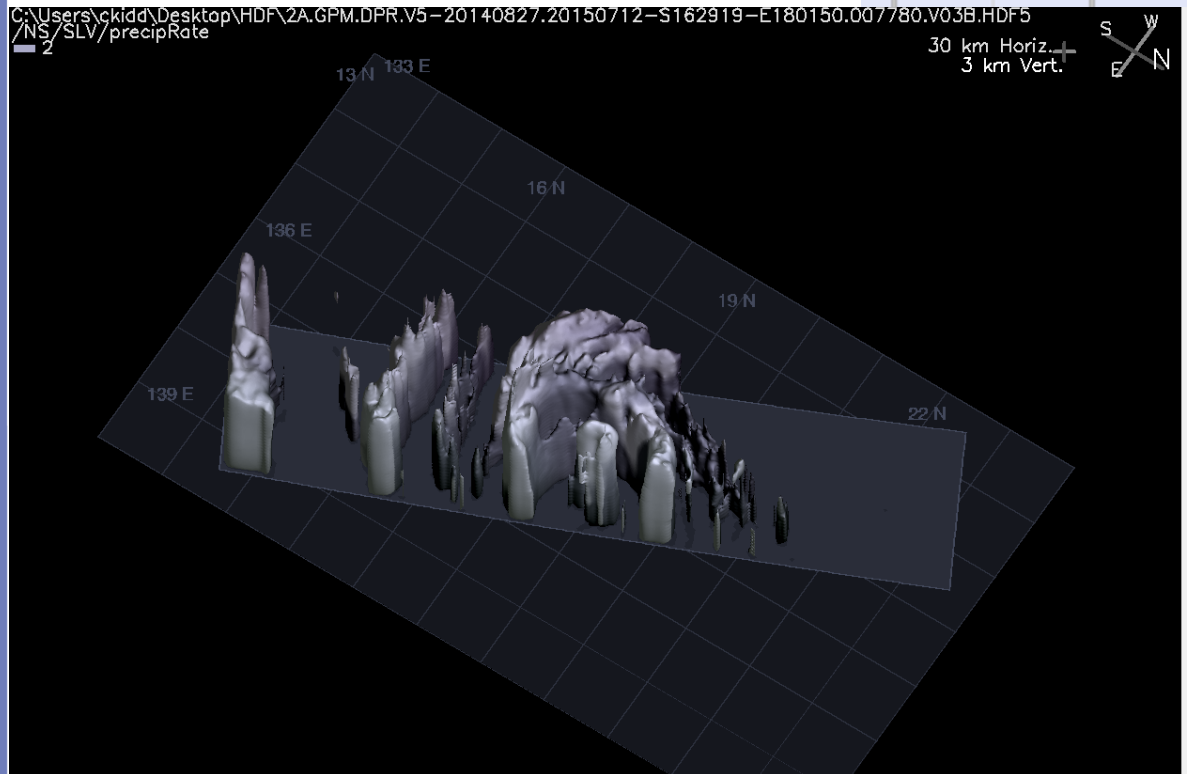
Flood.umd.edu, Adler/Wu

IMERG: 7/6/2015 – 7/13/2015



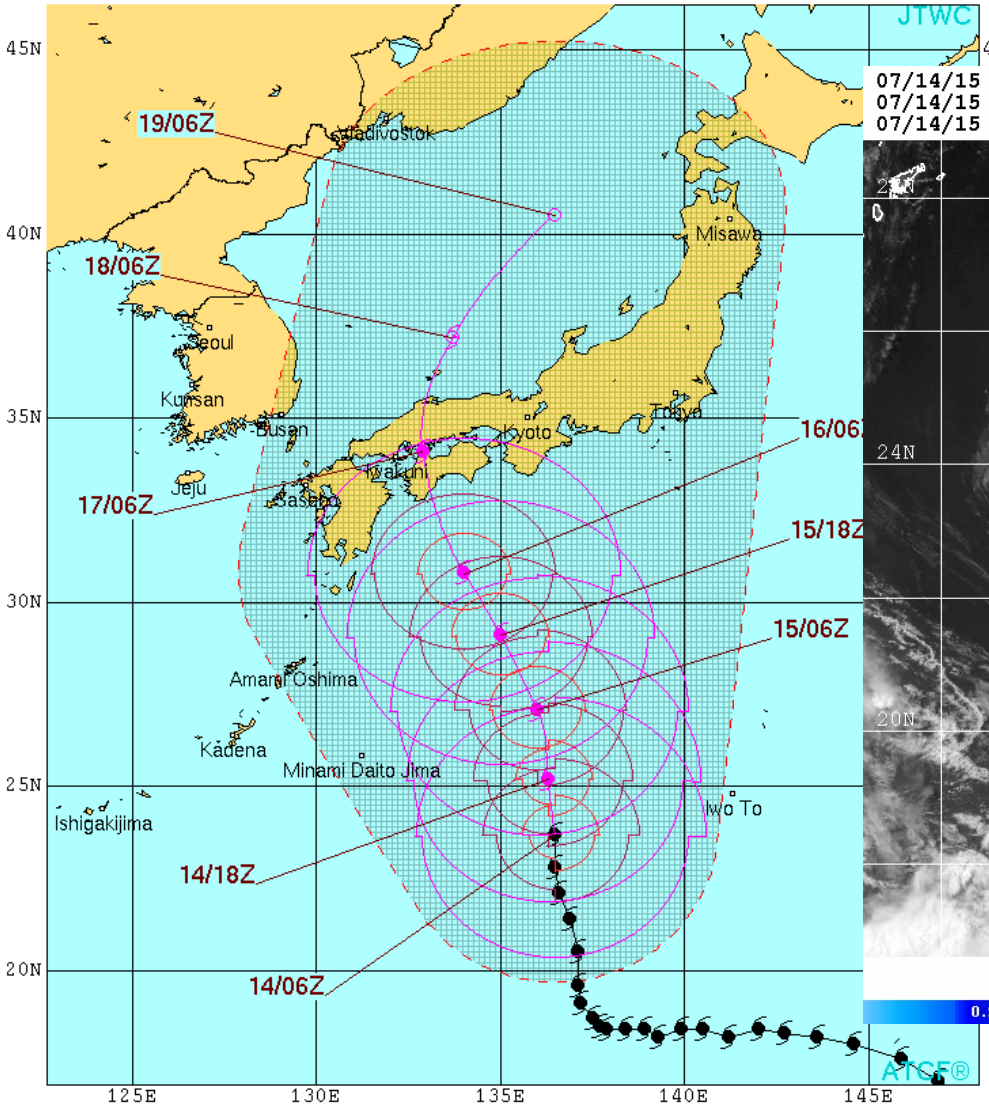
Typhoon 11W (Nangka) 2015-07-12 ~17:30Z

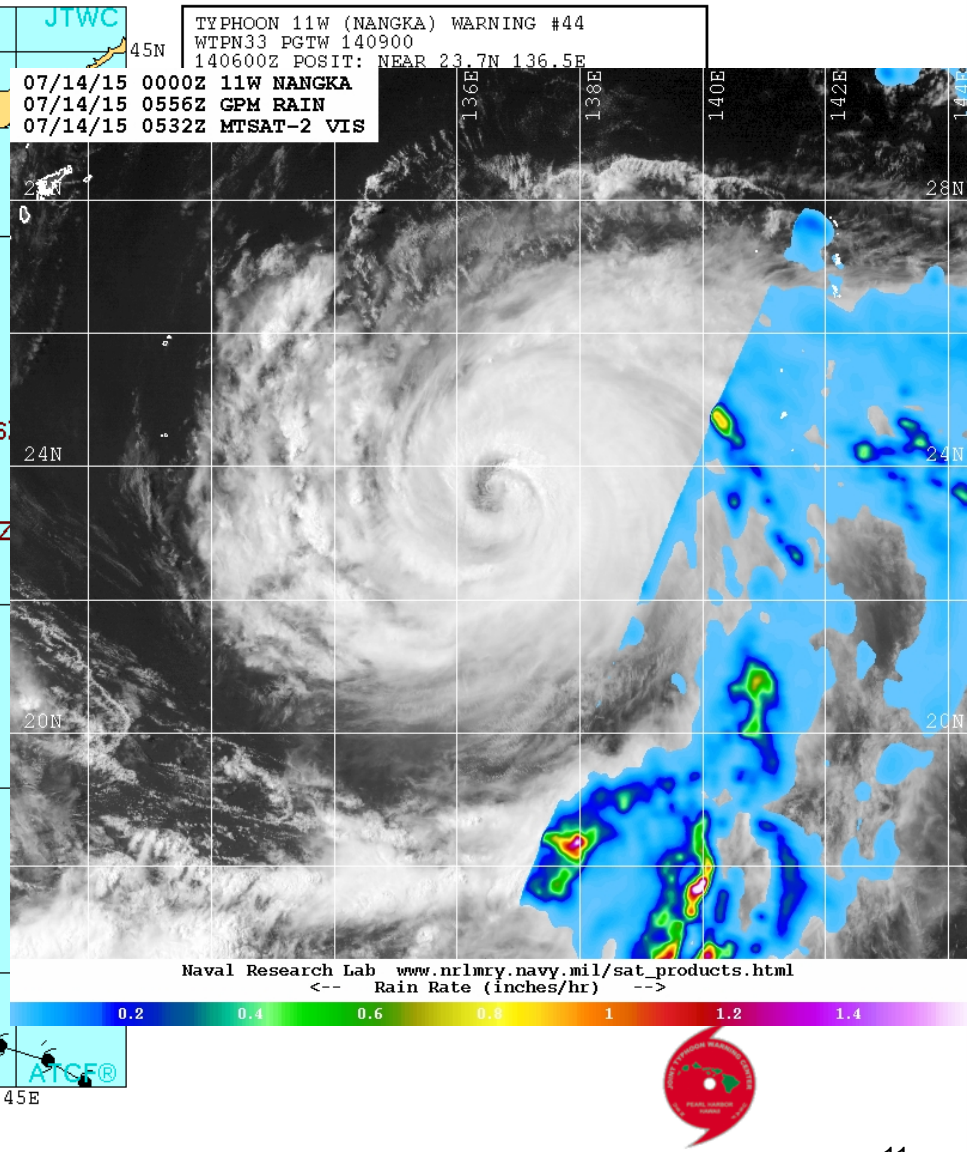




Courtesy of Chris Kidd

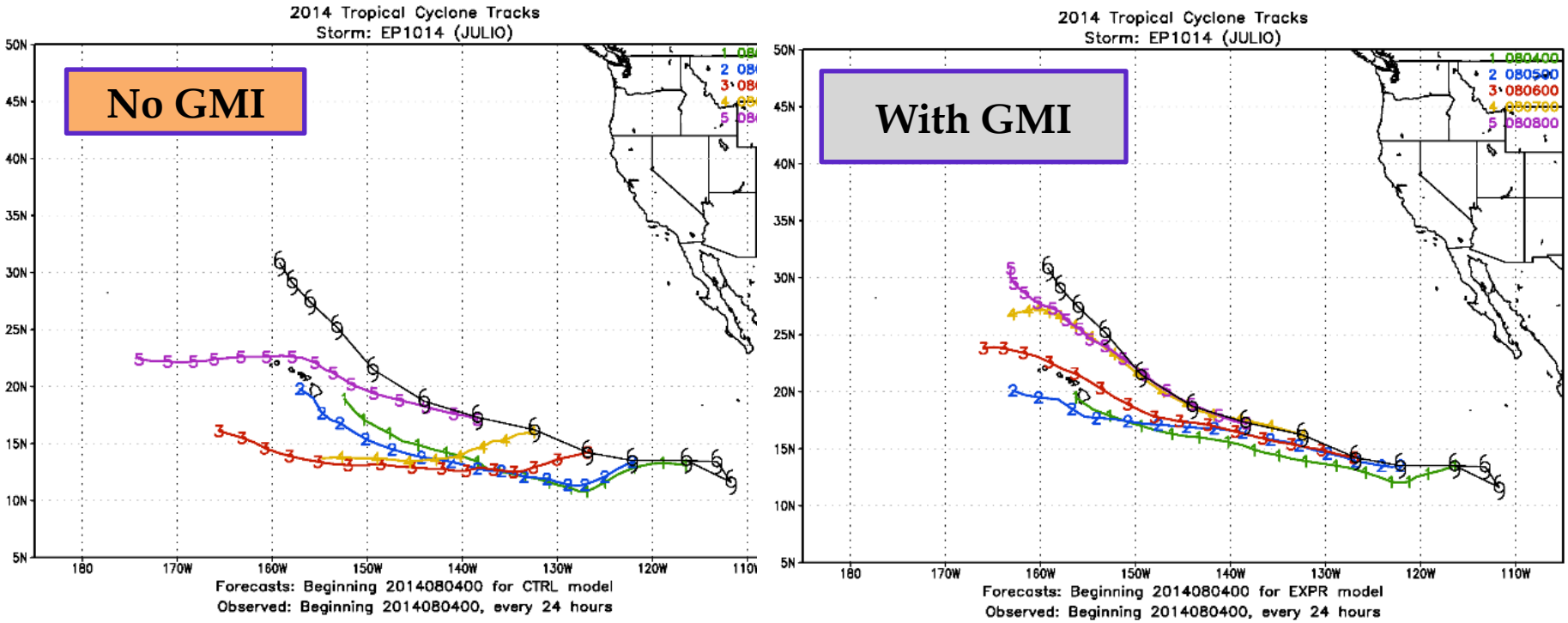
Track forecast: Typhoon 11W (Nangka)





Hurricane Julio Example

Joint Center for Satellite Data Assimilation (JCSDA) uses GMI data to improve and accelerate the use of satellite observations in Numerical Weather Prediction.

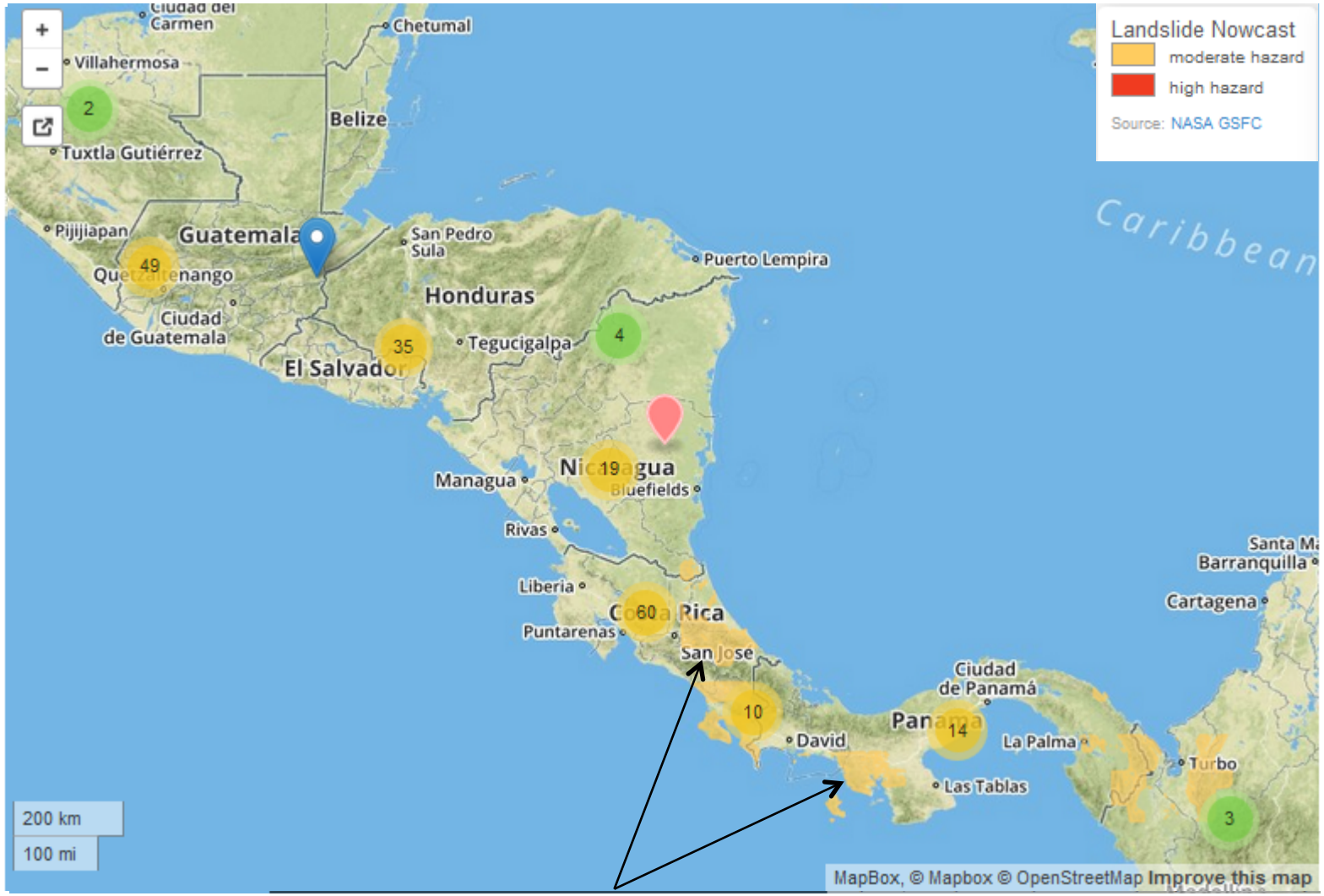


August 4 August 5 August 6 August 7 August 8

Forecasts tracks for Hurricane Julio (2014) from August 4 to August 8 ***with no satellite* data** assimilated (left), and ***with only GMI* data** assimilated (right). Both experiments assimilated conventional observations. The best track is shown in **black.**

Credit: Kevin Garrett/JCSDA

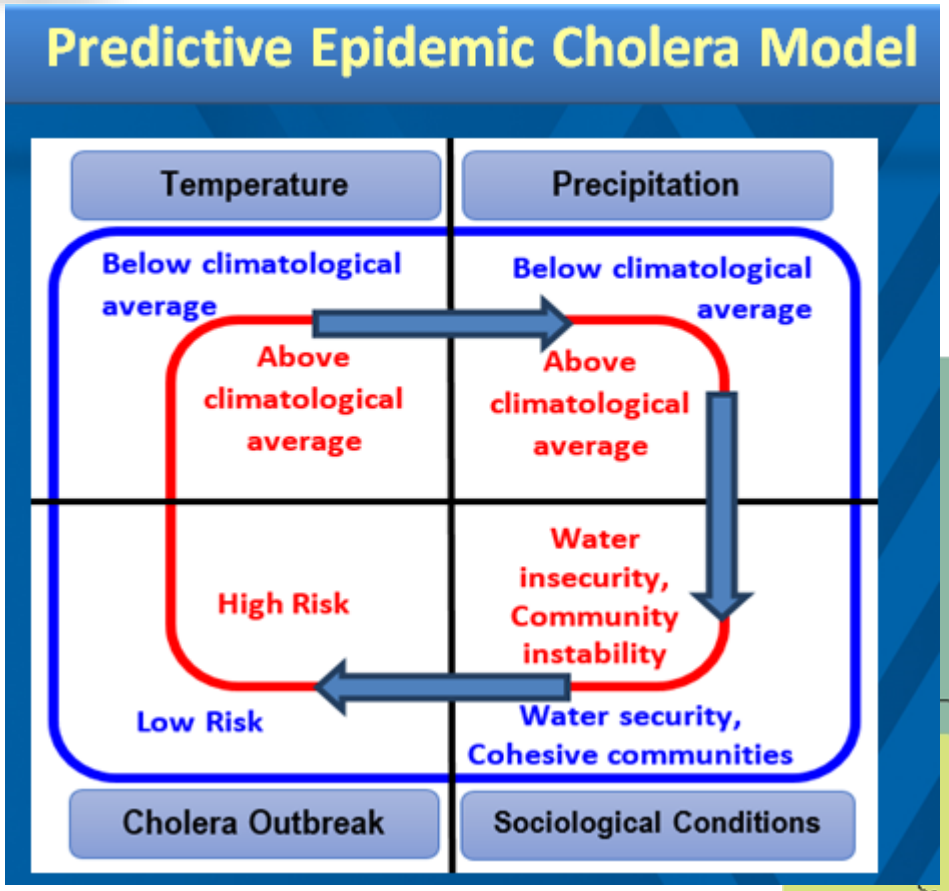
Landslide Modeling



Landslide "Nowcast" for 7/13/2015

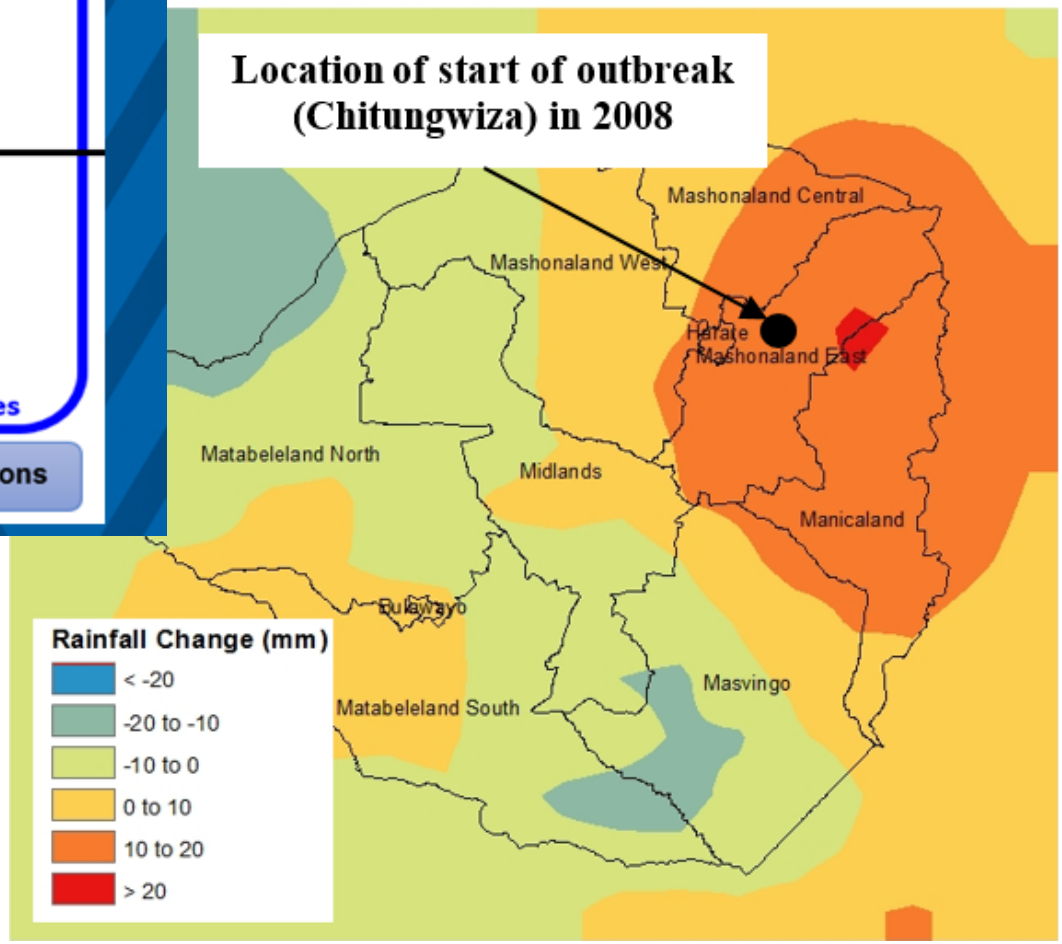
http://ojo-streamer.herokuapp.com/meso, Kirschbaum/GSFC

Cholera Modeling



Jutla et al., 2015 (AJTMH-Accepted)

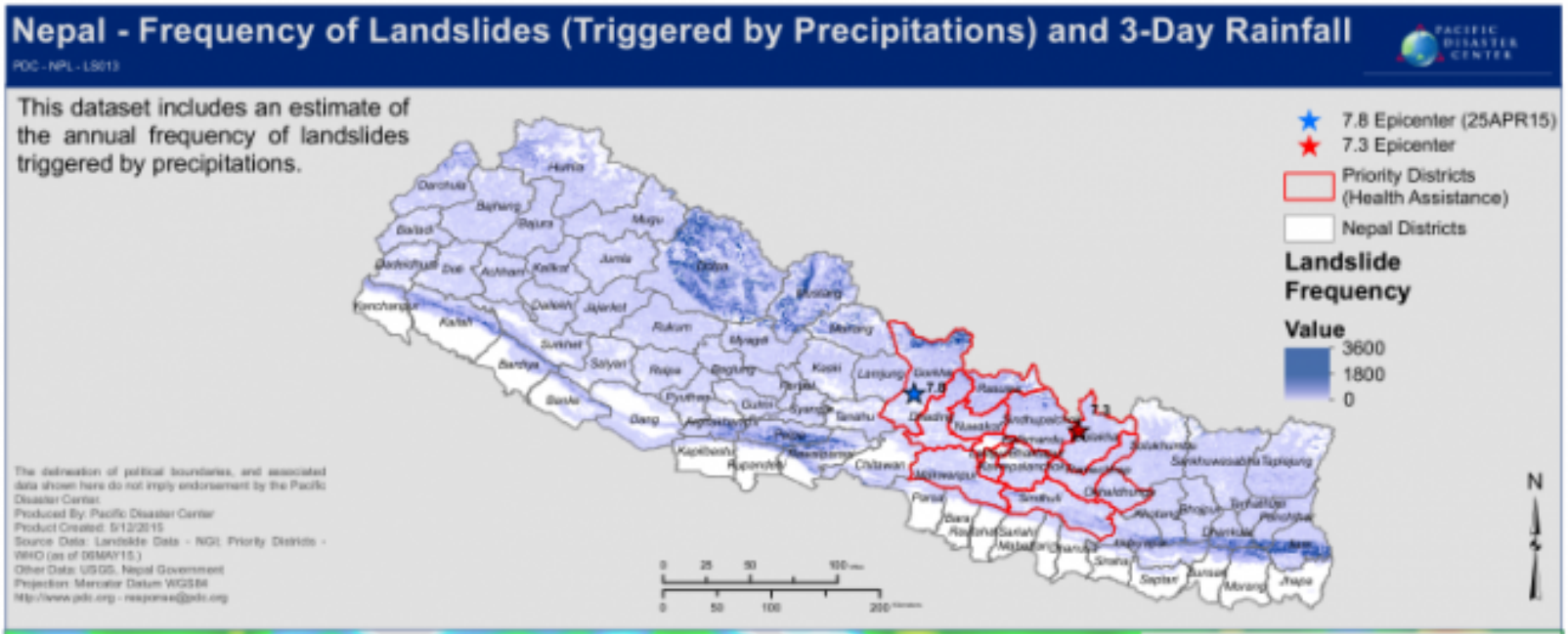
Use of TRMM/GPM data can provide near real-time indication of potential Cholera outbreaks

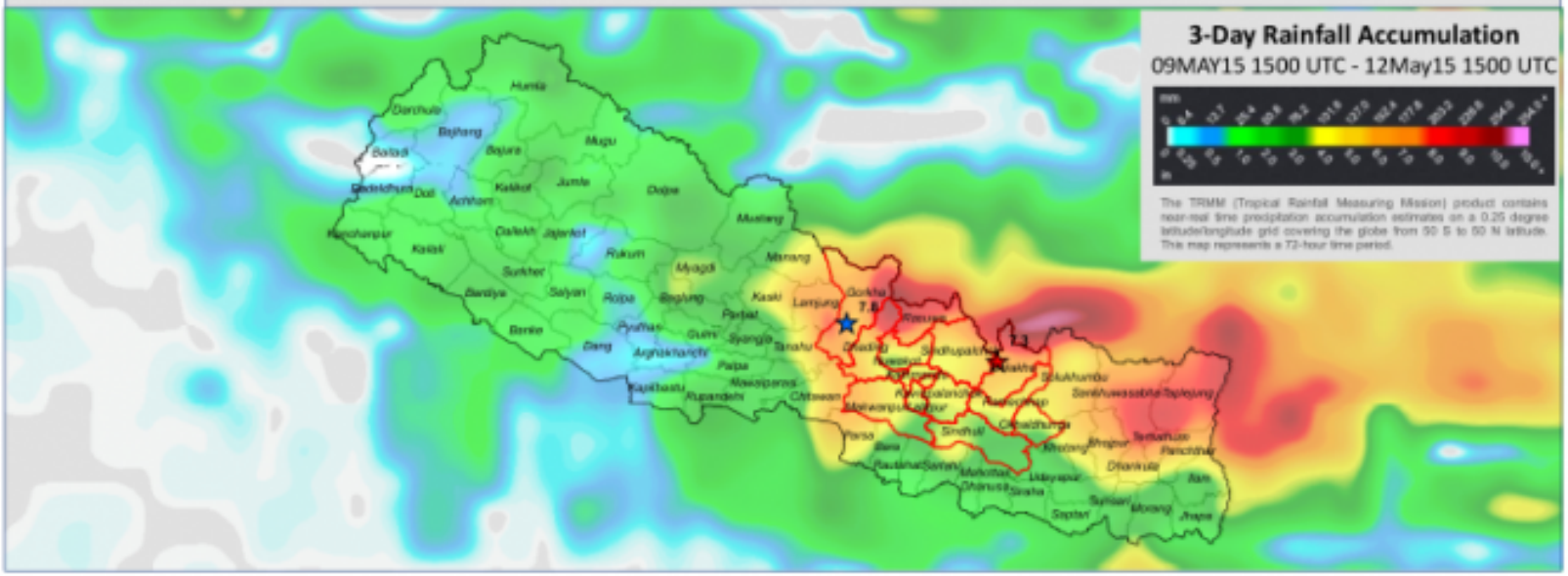


Antar Jutla,
West Virginia University

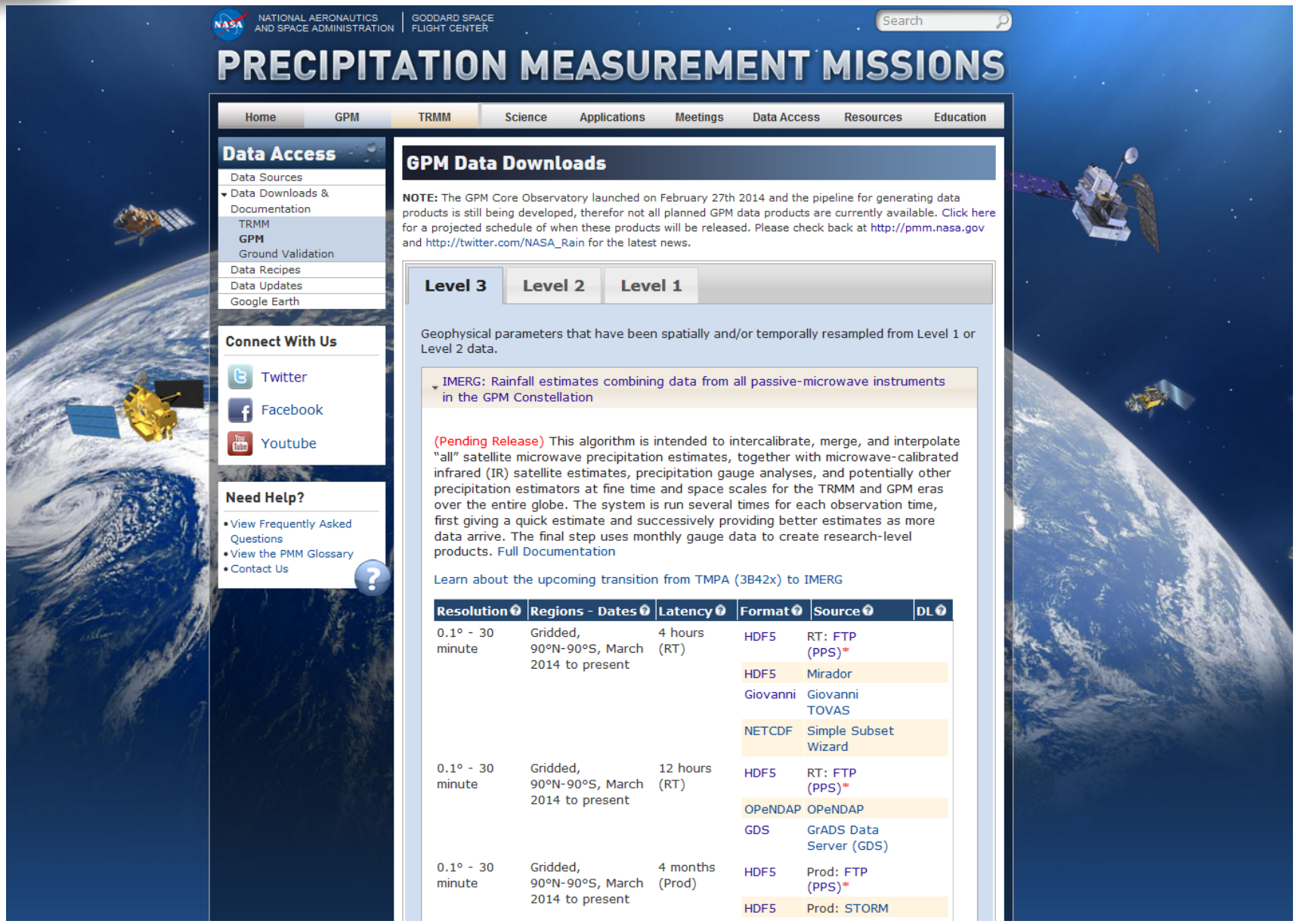
Disaster Situational Awareness

Pacific Disaster Center





Data Access


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
Search
PRECIPITATION MEASUREMENT MISSIONS
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GPM
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Meetings
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Education
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Data Sources
Data Downloads & Documentation
TRMM
GPM
Ground Validation
Data Recipes
Data Updates
Google Earth
Connect With Us
Twitter
Facebook
Youtube
Need Help?
View Frequently Asked Questions
View the PMM Glossary
Contact Us
GPM Data Downloads
NOTE: The GPM Core Observatory launched on February 27th 2014 and the pipeline for generating data products is still being developed, therefor not all planned GPM data products are currently available. Click here for a projected schedule of when these products will be released. Please check back at http://pmm.nasa.gov and http://twitter.com/NASA_Rain for the latest news.
Level 3
Level 2
Level 1
Geophysical parameters that have been spatially and/or temporally resampled from Level 1 or Level 2 data.
IMERG: Rainfall estimates combining data from all passive-microwave instruments in the GPM Constellation
(Pending Release) This algorithm is intended to intercalibrate, merge, and interpolate "all" satellite microwave precipitation estimates, together with microwave-calibrated infrared (IR) satellite estimates, precipitation gauge analyses, and potentially other precipitation estimators at fine time and space scales for the TRMM and GPM eras over the entire globe. The system is run several times for each observation time, first giving a quick estimate and successively providing better estimates as more data arrive. The final step uses monthly gauge data to create research-level products. Full Documentation
Learn about the upcoming transition from TMPA (3B42x) to IMERG
Resolution
Regions - Dates
Latency
Format
Source
DL
0.1° - 30 minute
Gridded, 90°N-90°S, March 2014 to present
4 hours (RT)
HDF5
RT: FTP (PPS)*
HDF5
Mirador
Giovanni
Giovanni TOVAS
NETCDF
Simple Subset Wizard
0.1° - 30 minute
Gridded, 90°N-90°S, March 2014 to present
12 hours (RT)
HDF5
RT: FTP (PPS)*
OPeNDAP
OPeNDAP
GDS
GrADS Data Server (GDS)
0.1° - 30 minute
Gridded, 90°N-90°S, March 2014 to present
4 months (Prod)
HDF5
Prod: FTP (PPS)*
HDF5
Prod: STORM

Education and Public Outreach

Education

- Teacher Workshops
- 30 Teachers (3-5th grade) at GSFC for a week-long summer watershed institute
- Booth and conference tables and public engagement
- School visits
- Lesson plan development
- Engagement with GLOBE
- Citizen Science (CoCoRaHS, Wallops)

Outreach

- Social Media:
  - Facebook.com/**NASA.Rain** – **21k** followers
  - Twitter.com/**NASA_Rain** – **13k** followers
  - Let us know how you're using GPM data!
- Photo Contests
  - pmm.nasa.gov/signs-of-spring-winners – 800+ entries
- Websites:
  - pmm.nasa.gov - www.nasa.gov/gpm
- Videos and animations
  - svs.gsfc.nasa.gov/Gallery/GPM.html
- Handouts, educational resources
  - pmm.nasa.gov/education
- GPM Extreme Weather News
  - pmm.nasa.gov/extreme-weather

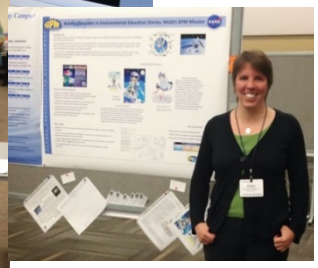
Educational GPM Anime Comic Coming in Fall 2015

"Raindrop Tales: GPM Meets Mizu-Chan"

pmm.nasa.gov/education/comics

Education Highlights of the Past Year

35 workshops, webinars and conference presentations reaching nearly 700 educators



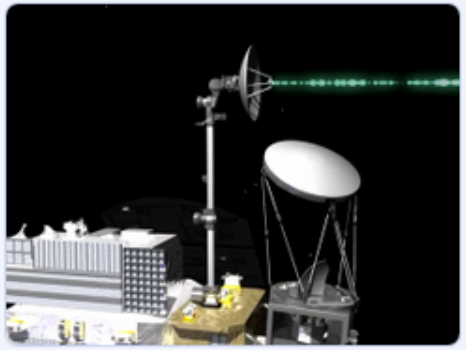
31 presentations at schools, libraries, after school clubs, summer camps and online reaching over 1800 students.

GPM-GLOBE Student Field Campaign began 2/2015; so far, participants come from 17 states and 10 countries

GLOBAL PRECIPITATION MEASUREMENT

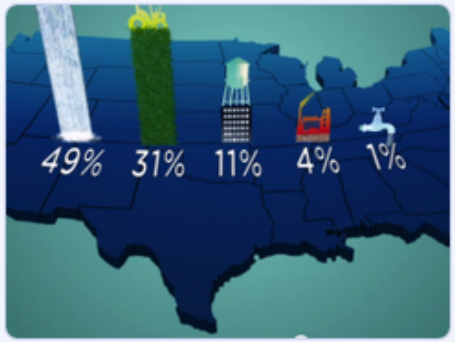
Videos

The Data Downpour



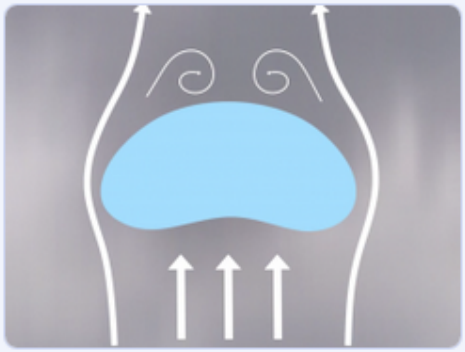
In a data-processing room at NASA's GSFC, racks of high-powered computers are getting ready to make a global map. Link

Show Me The Water



Just three percent of the water on our planet is freshwater. This video explores how our most precious resource is used, Link

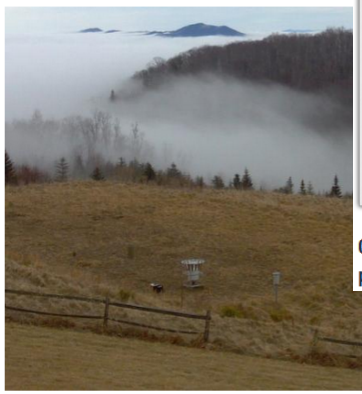
The Anatomy of a Raindrop



Raindrops are actually shaped a hamburger bun. This new video from GPM explains why. Link

Feature Articles

Rain Gauges in the Smoky Mountains



Rain gauges and other rain monitoring equipment are set up thro
the Appalachians) to capture rainfall for the GPM ground validatio
to June 15, 2014.

Learn more about IPHEx

NASA Satellites Predict Zebra Migrations

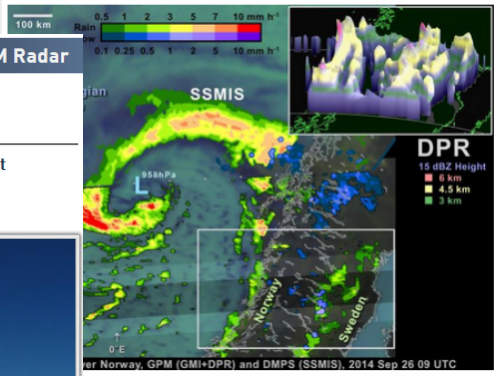
Zebra in the Makgadikgadi grasslands.

Image Credit: *Hattie Bartlam-Brooks*

Of stars and stripes: NASA satellites used to predict zebra migrations

GPM Satellite Sees a Windstorm over Norway

On September 26, the Global Precipitation Measurement (GPM) satellite flew over an extra-tropical cyclone whose center was approaching Norway. The Norwegian weather service reported that this storm brought gale-force winds to parts of Norway's coast and mountains (20 m/s in the mountains and 50 m/s just off-coast, late at night on September 26).



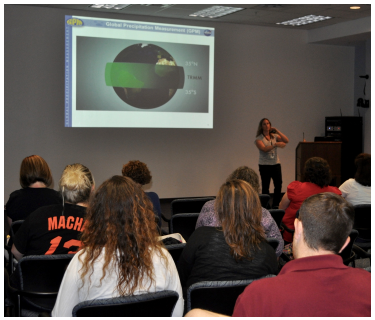
Bird Migration to be Tracked by GPM Radar

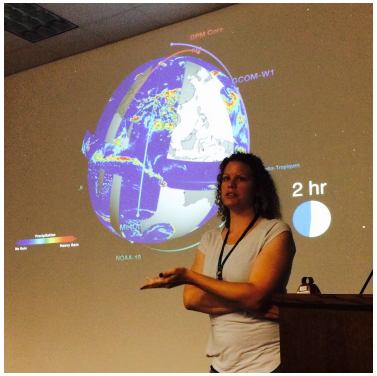
By Ellen Gray, NASA Goddard Space Flight Center

Original www.nasa.gov Press Release (published 6/7/12)

NASA and Nature Conservancy Agreement Supports Precipitation and Migratory Bird Research

Summer Watershed Institute





GPM sponsored the Summer Watershed Institute for 30 Maryland teachers from July 6th through 10th. These teachers were introduced to NASA's Earth Science missions, the science behind Earth's spheres, and focused on how these missions are able to give us information about the Chesapeake Bay region. Many GSFC scientists and engineers presented to the teachers to help them learn more about the science and technology.

The teachers learned how to collect and report data using The GLOBE Program protocols, and will integrate these hands-on investigations into their ongoing curriculum for the next school year.

GLOBAL PRECIPITATION MEASUREMENT

For more information on the TRMM and GPM Missions:

http://gpm.nasa.gov

www.nasa.gov/gpm

Twitter: NASA_Rain Facebook: NASA.Rain

Education and Public Outreach